

# Corps of Engineers Draft Feasibility Report Concludes the Antelope Creek Flood Control Project is Economically Feasible

The Army Corps of Engineers recently released the Antelope Creek Draft Feasibility Report and Draft Environmental Assessment that concluded a proposed flood control project is economically feasible. The flood control project recommended for cost sharing provides maximum annual economic benefits in excess of annual costs with annual net benefits of \$4,535,000 and a benefit-cost ratio of 1.23.

The important finding that benefits exceed costs means the \$53 million new Antelope Valley waterway is eligible to be cost shared with the Federal Government. Approximately \$25 million of Federal funding would be provided. It is anticipated that State, City and LPSNRD funds will be used for the remaining \$28 million of costs. Completion and approval of the Corps of Engineers Final Feasibility Report and the Chief of Engineer's Report, and Congressional authorization of the flood control project in the Water Resources Development Act of 2000 are expected by the end of the year.

The Feasibility Study determined the estimated annual flood damage is \$5.3 million assuming no flood control project is constructed. This figure considered damages generated by infrequent, but catastrophic floods as well as those due to more frequent floods of much smaller magnitude. The severity of flood damage and the likelihood of flooding on an annual basis were both taken into consideration to determine the estimated annual damage.

One of the less frequent levels of flooding considered, which is important because of its effect on land use regulations, is the 100-year flood. This is the flood caused by a storm so severe that it has only a one percent statistical chance of occurring annually. More severe floods are considered in the flood damage analysis, but this one is important because it is the basis of the flood hazard area outline used for land use regulation. The City has stringent requirements controlling and limiting new construction and redevelopment of existing structures in the 100-year flood hazard area. These regulations are designed to minimize flood damage to future construction, but do nothing to prevent damage to existing buildings and contents.

The proposed Antelope Creek flood control project from the mouth to "J" Street will reduce approximately 80 percent of the estimated annual flood damage and will reduce and confine the 100-year flood plain within the channel banks. Unfortunately, no one can control the timing or amount of rainfall. Consequently, there is also a statistical chance a 100-year storm can occur twice in one year, or twice in five years or twice in 500 years. The question is not if a 100-year storm will happen but when. No one knows and the only real protection is for a community to implement proper floodplain management controls.

Antelope Creek is a small stream that starts near 91st and Pine Lake Road, flows through Holmes Lake, meanders in an open channel underneath many street bridges and through many residential and business neighborhood areas until it is forced underground into an enclosed conduit near 23rd & "N" Street, just west of Elliott Elementary School. It then disappears from sight and goes underneath several buildings, including Office Max, until it leaves the enclosed conduit southwest of Cushman near 21st and Vine Streets. The final creek leg meanders in an open channel again underneath many street bridges, through the eastern edge of the UNL campus, then underneath the Burlington Northern Santa Fe Railway tracks, and finally travels between North 14th Street and the west edge of State Fair Park, where it empties into Salt Creek south of Cornhusker Highway.

Because of increased run-off caused by urban development in the lower reaches of the Antelope Creek basin between Holmes Lake Dam and the conduit, only a four-year or smaller storm is calculated by the engineers to fit into the conduit and any larger storm would exceed the conduit and cause the excess water to travel overland, flooding many East Downtown, University, Malone, Clinton and North Bottoms neighborhood streets and properties.

The open stretches of Antelope Creek also have wide flood plains that deter redevelopment opportunities. Various street bridges crossing the open creek are too small. Lack of adequate water openings underneath the bridges cause the bridges to act as small dams, flooding properties. The small conduit and inadequate bridges cause the Federal Emergency Management Administration (FEMA) designated 100-year floodplain to reach from four to seven blocks wide in many stretches. Besides the great width of the flooding path in a 100-year flood, some Antelope Valley areas would be underneath up to six feet of water at the height of the flood.

Without Holmes Lake Dam, the downstream flooding potential would



Entrance to Antelope Creek at 23rd and "N" street. The entrance consists of two box culverts each eight feet high by nine feet wide. The gentleman standing in the opening is six feet tall.

be much greater. Holmes Lake Dam has been able to capture and hold flood water at the upper end of the watershed but cannot capture rainwater falling in the seven square miles of the Antelope Creek basin lying below the Holmes Lake Dam. Since the completion of the Holmes Lake Dam in 1962, this downstream section has added new dwelling units, businesses, parking lots and streets, which have increased the storm run-off and potential downstream flooding in the historical core area.

The small conduit, small bridge openings and extensive development have all combined to cause approximately 600 acres, 1,300 structures and 1,800 residents to be at risk of flooding and included within the currently designated 100-year flood plain. Based on the hydrologic and hydraulic analysis prepared by the Corps of Engineers, it was determined that widespread damage from flooding is likely to start with the occurrence of an event with an annual probability of 0.125 (eight-year event). In addition to millions of dollars in flood damage to property, buildings, contents and infrastructure, there is also the potential for injuries and deaths. In 1908, ten lives were lost when a big storm hit the Antelope Valley basin.

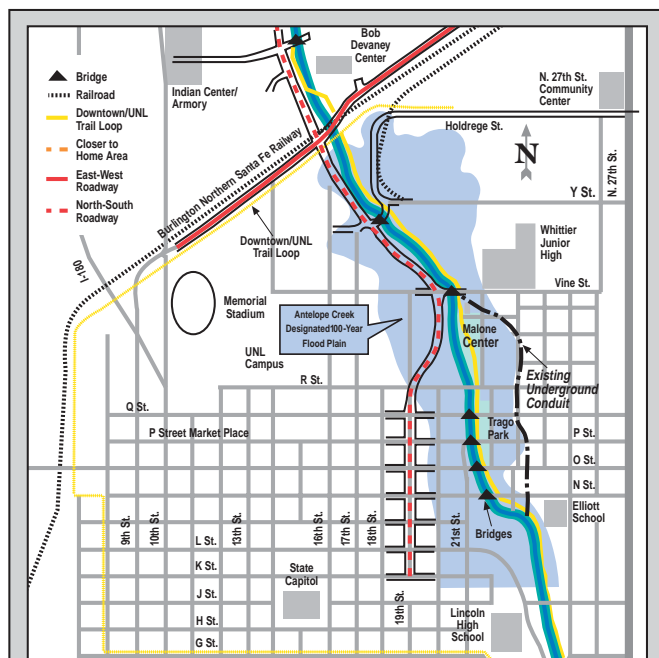
For four years the community and the Army Corps of Engineers has been trying to solve the serious risk and looking for the best set of flood plain management solutions. Many stormwater alternatives were identified, priced, measured and screened in light of other proposed transportation networks, abutting land uses, and redevelopment potentials. Some of the other alternatives explored included:

- Build another dam like Holmes Lake Dam somewhere in the watershed;
- Install up to seven large underground conduits;
- Construct three or four very large detention ponds to store water in the vicinity of 27th & Randolph Streets and Antelope Creek, and Antelope Park area;
- Lower existing streets and the proposed North-South Roadway to carry storm water through the area;
- Build a large overflow detention area on part of the Lincoln High campus and the Lewis Ballpark and relocate Capital Parkway on the south and west sides of Lincoln High School.

These and other alternatives were eliminated because they were too costly, too disruptive to neighborhoods and/or did not adequately protect the impacted areas from a 100-year flood.

The recommended Antelope Valley stormwater solution proposes keeping the underground conduit in place and building a two-mile, grassy, gently sloped open waterway at the low point

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Consultants say a proposed flood-control project along Antelope Creek would reduce and contain the designated 100-year flood plain within the channel banks. This would ease economic development restrictions and would reduce flood damage that could cost millions of dollars to property, buildings and contents. An open channel at the western edge of the Malone Neighborhood would carry most of the floodwaters.

## Past Flooding Events

During the 1900s, several major Antelope Creek floods caused considerable damage to the City of Lincoln. The source of this flooding is the inability of Antelope Creek to hold flood waters during heavy rains. Antelope Creek is a tributary of Salt Creek (which originates in Cheney) and flows northwest through the City and into Salt Creek near north 14th Street and Military Road.

Prior to 1908, there was virtually no concern for flood control. However, as the City grew and houses and businesses took the place of farm fields and prairies, the banks of Antelope Creek were unable to hold heavy rains. In July of 1908, nearly six inches of rain fell in Lincoln leaving hundreds of people homeless, killing at least ten people and causing considerable damage to property, crops and roads. Following this flood, City officials began building a 4,065 foot box underground culvert, officially known as the Antelope Creek Box Conduit to replace the open waterway. This conduit took 5 years to complete and in turn, the existing creek was filled in and citizens responded by building homes and businesses in close proximity. The conduit is still there today with water flowing under businesses, streets and homes from 23rd and "N" Streets to 19th and Vine.

On June 14, 1951, eight inches of rain fell in merely four hours which clogged the mouth of the culvert and sent water spilling over the banks. No lives were lost in this flood, but property damage was estimated at \$475,000, houses were washed away, basements filled and streets were impassable for hours.

Additional floods prompted President Dwight D. Eisenhower in 1957 to sign a bill authorizing the construction of a dam at 56th and Van Dorn. Since the completion of the Holmes Lake Dam in 1962, no 100-year floods have occurred; however, some local flooding such as in July, 1967, resulted from several heavy rains. On September 8, 1989 Holmes Lake reached a record high elevation when a storm dumped eight inches of rain in the Antelope Creek basin. Engineers estimated that damage could have exceeded \$15 million without



A different mode of travel was needed to get around at 21st and "K" Street on July 26, 1967. Heavy rain was the single cause of the flooding. Lincoln Journal Star

the dam. Though the Holmes Lake Dam, which is on the upper end of Antelope Creek, has done a good job of preventing floods, it is just a matter of time before a 100-year flood poses a substantial risk to downstream property owners where the dam provides no protection.

Since the construction of Holmes Lake, additional in-fill urban development has taken place in the Antelope Creek basin between Salt Creek and the Holmes Lake Dam, which has increased storm run-off and potential downstream flooding.

In 1993, the conduit was showing considerable wear and tear as a result of time, water and salt, so voters approved a \$4 million bond issue in 1993 to repair the 1908 conduit. The Lower Platte South Natural Resources District and City of

Lincoln jointly worked together on the repair of the conduit to strengthen and extend its life. However, these repairs, including a new liner, reduced the capacity by approximately 16 percent. Engineers now estimate that the Antelope Creek Conduit can only carry up to a four year storm and any larger storm will have to go over land, flooding parts of Downtown, the University, Woods Park, Malone and Clinton neighborhoods and UNL since there is no available open waterway.

According to the Corps of Engineers, a 100-year rainfall currently would result in floodwaters three to six-feet deep along the conduit entrance to exit and would extend approximately five blocks across and would cause millions of dollars in flood damages.

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of the Antelope Creek valley. This solution is the preference of the citizen Advisory Committee and was confirmed at the community Town Hall 2 Meeting in November, 1997. In turn, the three Partners incorporated the recommendation into the Amended Draft Single Package, which was reviewed positively by the Planning Commission, County Board and City Council in 1998. This is also the stormwater recommendation the Army Corps Feasibility Study found had merit by concluding that benefits exceed costs (which allows the recommendation to be eligible for federal cost sharing.)

### The Phase 1 Projects incorporate the entire Antelope Valley stormwater recommendation and includes the following components:

- **Landscaped Antelope Creek waterway to carry 100-year flood waters:** Antelope Creek would be restored within a one-half block wide linear park as an open waterway carrying flowing water north. The stream banks would gently rise as grassy areas and a bike trail from a point near "J" Street and Lewis Ball Fields, heading north, then turning northwest and paralleling 21st Street on the east side. The waterway would gradually turn westward one block beginning at "R" Street to the western border of Trago Park, turn due north, and con-

tinue to Vine Street, to the University and State Fair Park then into Salt Creek.

#### • Encourage Reinvestment

**Opportunities:** The new open linear park waterway will be aesthetically designed and attractive to encourage nearby recreational, housing and business redevelopment opportunities. Narrowing of the four to seven block wide floodplain will increase the market value of existing businesses and homes, which will encourage more renovations and maintenance and in turn help abate blighting conditions.

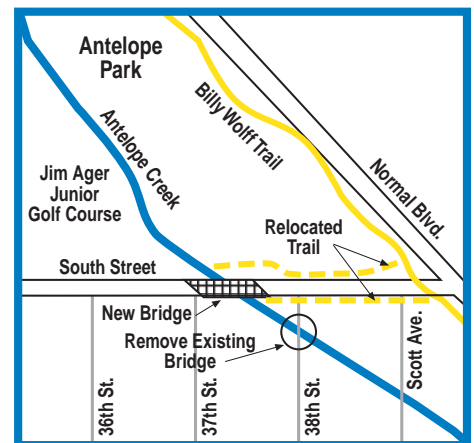
- **Reduction of the designated 100-year flood potential:** A total of over 1,100 structures and 50 acres of the UNL City Campus would no longer be threatened by the possibility of severe Antelope Creek 100-year flooding. The new conveyance system would fully accommodate a 100-year storm within its banks, which in turn would ease development restrictions on land currently within the four to seven block wide designated 100-year floodplain. The South Street bridge over Antelope Creek would also be reconstructed and the Antelope Creek bridge at S. 38th Street would be removed to provide additional flood plain protection.

- **Maintenance:** The use of the existing conduit and the proposed open waterway design will minimize clean up costs after a heavy storm. By combining resources and using special purpose districts, the City and Lower Platte South Natural Resources District believe maintenance costs will not overburden taxpayers.

## 38th Street Bridge and South Street Bridge

The most upstream elements of the Antelope Valley storm water improvements would eliminate existing bridge restrictions at 38th Street and at South Street. During intense storms the bridges back up water in Antelope Creek, causing flooding to abutting homes in the South Street and Normal Blvd. vicinity.

Removal of these two bridge restrictions would allow the water to continue down the creek corridor in an unimpeded course. In turn, about 325 structures, including 300 homes within the Normal Boulevard and South Street area would be free of the designated 100-year floodplain.



### To relieve the existing flood hazard, the Phase 1 Projects propose to:

- Reconstruct and lengthen the South Street bridge over Antelope Creek just south of the Jim Ager Memorial Junior Golf Course.
- Remove the 38th Street bridge and dead-end 38th Street on both sides of Antelope Creek. Constructing a new 38th Street bridge did not appear cost effective given the cost of the bridge, traffic volume on the street and the existence of four alternative access routes within a two block area.